Acidified Sodium Chlorite

INTERVENTION SUMMARY	
Status	Currently available
Location	Post-slaughter
Intervention type	Surface treatment of carcasses, primals, trimmings
Treatment time	10-15 seconds
Regulations	Approved in the EU, US and Australia In Australia, chlorine dioxide may be used as a processing aid in meat production, providing that residual chlorine compounds cannot exceed 1 ppm in the final product
Effectiveness	Good if application is adequate (e.g., sprays configured correctly)
Likely cost	Capital cost for spray cabinet and on-going cost for purchase of chemicals
Value for money	Good
Plant or process changes	Space is required for installation of spray cabinet, though can modify an existing spray cabinet
Environmental impact	No toxic by-products
OH&S	Appropriate ventilation around spray cabinet, safe handling of chemicals at point of generation
Advantages	Not corrosive at recommended concentrations Classified as a 'No-rinse' food grade sanitiser Not affected by organic loading on product
Disadvantages or limitations	Full coverage of meat surface required

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The antimicrobial activity of acidified sodium chlorite (ASC) is attributed to the oxidative effect of chlorous acid, which is derived from the conversion of chlorite ion into its acid form under acidic conditions. The reactions happen instantly on mixing the sodium chlorite with an acid (e.g., citric or phosphoric acid) and therefore the antibacterial solution needs to be prepared shortly before spraying – the effective shelf life is less than one hour. One company (Grayson Australia) has developed a system which mixes the chemicals immediately before application to maximise the oxidising power of the solution.

Acidified sodium chlorite is approved for use in the US at concentrations between 500 and1200 ppm (21 CFR 173.325; FDA, 2013). In Australia, FSANZ has also approved the use of acidified sodium chlorite as a processing aid for use on poultry meats, meat and formed meat products at a concentration of 500-1200 ppm. As a result, the Food Standards Code was amended to accommodate this application – Standard 1.3.3., Clause 14 permits the use of sodium chlorite as an antimicrobial agent for meat, fish, fruit and vegetables as long as a residual level of chlorous compounds do not exceed 1 ppm (FSANZ, 2013).

Some studies have demonstrated a 1.9–2.3 log reduction in *Salmonella* and *E. coli* O157 on beef carcass tissue using a wash or spray of sodium chlorite activated with citric acid (Ransom *et al*., 2003). One laboratory trial showed up to 4.6 log reduction in *E. coli* O157:H7 and *Salmonella* using a water wash followed by an acidified sodium chlorite spray (Castillo *et al*., 1999). Other studies indicated limited success (Gill and Badoni, 2004). Kalchayanand *et al*. (2012) also found that spray treatment with acidified sodium chlorite was not as effective at reducing *E. coli* O157 on beef flanks as spray treatments with hot water, lactic acid or peroxyacetic acid.

It appears that the method of activation (i.e., type of acid used), the method of application (e.g., type of sprays), and the contact time with the meat surface are strong influences on the success of this microbial inhibitor. Recent work by Kim *et al*. (2014) has reported that mixing high concentrations of the reactants (>40%) and then diluting after reaction (DAR), leads to more effective inactivation of food-borne pathogens, including *E. coli* O157:H7 and *S.* Typhimurium, when compared to commercially available systems. Research using acidified sodium chlorite to sanitise beef trim (using SANOVA® system marketed by Alcide Corporation, now part of Ecolab) achieved reductions of 1.4–2.3 log *E. coli* depending on the feed rate of the spray. Furthermore, there is evidence suggesting that acidified sodium chlorite may be a long-acting microbial inhibitor and may be suitable for pre-packaged meat. Bosilevac *et al*. (2004) published results using a 300 ppm acidified sodium chlorite treatment that reduced total microbial counts by 1.0–1.5 log and maintained desirable organoleptic qualities of the ground beef.

Proponent/Supplier Information

Grayson Australia

Unit 4, 9 Newcastle Road,

Bayswater Victoria. Australia 3153

P.O. Box 134, Bayswater Victoria Australia 3153

Ph: 03 8727 6900

Fax: 03 8727 6999

Website: http://www.tecnica.com.au/

Brand name: Vibrex

Ecolab Australia

6 Hudson Avenue

Castle Hill NSW

Australia 2154

Ph: 02 9680 5444

Fax: 02 9680 1643

Website: http://www.ecolab.com/

Brand name: *Sanova*

References

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